

Data Acquisition & Conditioning Units



Data Acquisition and Conditioning Units

Bartington's wide range of data acquisition and conditioning units match specific needs for analogue conditioning, A to D conversion, magnetic field and vibration spectrum analysis, standalone signal conditioning, and power supply. They are compatible with most of our single and three-axis magnetic field sensors.

All units accept analogue input from our sensors and output the signal in either analogue or digital format, depending on the unit selected. The range includes:

Digital:

- Spectramag-6 Data Acquisition Unit
- Mag-03DAM Data Acquisition Module

Analogue:

- PSU1 Power Supply Unit
- Magmeter Power Supply and Display Unit
- SCU1 Signal Conditioning Unit
- DecaPSU

Product Compatibility

	PSU1	Magmeter	Spectramag-6	SCU1	Mag-03 DAM	DecaPSU
Mag592	•	•	•	•	•	•
Mag585	•	•	•	•	•	•
Mag670	•	•	•	•	•	•
Mag678/679	•	•		•		•
Mag-03	•	•	•	•	•	•
Mag-03RC	•	•		•		•
Mag648/649	•	•		•		•
Mag690	•	•	•	•	•	•

Spectramag-6 Data Acquisition Unit

This portable six-channel 24-bit data acquisition unit is designed for simultaneous collection and analysis of magnetic field, vibration and acoustic data in three axes. The six input channels provide synchronous digitisation of the outputs from magnetic field sensors, accelerometers, or acoustic sensors.

Features and options

- Combined with a PC via a USB interface, the unit can record data at rates up to 10kHz
- Supplied software collects and displays data in both the time and frequency domain to frequencies up to 3.5kHz
- Selectable AC and DC coupling, low-pass and FFT options available
- Battery or mains powered



Typical applications

- Magnetic field and vibration surveys
- Pre-installation MRI/electron microscope site surveys

Spectramag-6 specification	
Number of input channels	Six (2 groups of 3 channels selectable for magnetic field sensors, accelerometers or acoustic sensors)
Input signal range	$\pm 10V$
Frequency response (-3dB): magnetic field sensors accelerometers acoustic sensors	DC to 3.5kHz (DC coupling); 0.01Hz to 3.5kHz (AC coupling); reduced to 1kHz (1000 gain) 0.1Hz to 3.5kHz (AC coupling only) 0.1Hz to 3.5kHz (AC coupling only)
Resolution	24 bit A to D converter
Sampling interval	100 μ s (min) to 10s (max) up to 700,000 samples (PC dependent); continuous sampling mode (slower sample rates only)
Frequency domain display options	Amplitude spectrum (RMS, peak-to-peak); Amplitude spectral density (RMS/ \sqrt{Hz} , p-p/ \sqrt{Hz})
Analogue gain control	Software selected x1/x10/x100/x1000
Spectrum range	Software selected as sample rate or maximum frequency
Output interface	USB2
Software	Windows® 98/2000/XP/7 (32 bits) compatible
Operating temperature range	-10°C to +50°C (0°C to +45°C for charging)
Storage temperature range	-20°C to +70°C
Humidity	0–90% non-condensing
Enclosure	Aluminium
Dimensions (W x H x D)	170 x 112 x 210mm
Weight	2.85kg
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Spectramag-6 specification continued

Connectors	2 x Hirose RM15TPD10P fixed plug to magnetic field sensors 6 x BNC sockets for ICP® piezoelectric vibration sensors / microphone preamplifiers 1 x USB to PC 1 x 2.1mm socket for 12V input from mains adaptor for recharging
Sensor input (magnetic field sensor)	Unbalanced
Suitable ICP® vibration sensor	PCB Piezoelectronics type 393A03 (1V/g) low-noise rugged PCB Piezoelectronics type 393B31 (10V/g) low-noise rugged
Suitable ICP® microphone	GRAS Microphone Type 40AE (50mV/Pa)
Power output to sensor	±15V, ±75mA
Battery	Internal rechargeable Li-Ion 10.8V 72Wh UN approved battery with universal mains adaptor for charging
Battery life	8 hours (typical)
Battery charging time	10 hours for full charge
Input impedance (magnetic field sensor inputs)	1MΩ
ICP® constant current	4mA ±20% for cables up to 1km in length
Optional accessories	Tripod and adaptor for Mag-03 sensors Rugged carrying case
Carrying case dimensions	616 x 493 x 220mm
Total weight with carrying case	12kg with Spectramag-6, Mag-03 sensor, 5m cable and tripod



Mag-03DAM Data Acquisition Module

This portable, high resolution six-channel 24-bit acquisition unit is designed for the long-term recording of the Earth's magnetic field, or other magnetic fields producing DC and low frequency signals. Designed to provide maximum resolution at low sampling frequencies, it can connect and power one or two magnetic field sensors. If only one sensor is used, the other inputs can record analogue signals such as temperature.

Features and options

- Selectable sampling frequency, 16- or 24-bit A to D, and low-pass filter frequency
- Data sampling and storage is controlled by the user's Windows® PC
- Acquired data is time-stamped and saved to disk
- Mains AC/DC adaptor supplied for battery charging, also enabling continuous operation



Typical application

- Earth magnetic field monitoring

Mag-03DAM specification	
Number of input channels	Six (2x3 channels)
Input signal range	±10V
Resolution	16- or 24-bits, 24-bit monotonicity at up to 50Hz rate (single channel only)
Sampling rate	10Hz to 1027Hz software selectable
Scaling error	±0.05%
Linearity	0.002% of full scale at up to 50Hz data rate (typical)
Data acquisition card	Lawson Laboratories type 201*
Output interface	RS232
Operating temperature range	-20°C to +60°C
Storage temperature range	-40°C to +85°C
Humidity	0-90% non-condensing
Dimensions (W x H x D)	255 x 55 x 265mm
Weight	2.8kg
Enclosure	Aluminium
Connectors: mains adaptor sensor RS232 analogue output	2.1mm DC inlet 2 x Hirose RM15TRD10P 25-way D type 9-way D type
Power output to sensor	±15V, 54 ± 10mA
Sensor input	Unbalanced
Analogue output voltage	±10V
Power input	9 to 24V DC, 120mA via mains adaptor provided
Battery	12V, 2.1Ah, lead acid
Battery life	6 hours (dual sensor), 11 hours (single sensor)
Battery charging time	10 hours (typical)
Fuse	1A

* See the website of Lawson Laboratories (www.lawsonlabs.com) for more information.

PSU1 Power Supply Unit

The PSU1 can be used with most Bartington Instruments magnetic field sensors, both as a self-contained, portable power supply for the sensor and to provide simple access to filtered versions of the sensor's XYZ outputs.

Features and options

- When used with Bartington balanced (differential) sensors, the unit converts their analogue outputs into unbalanced (single-ended) signals
- Low-pass filtering (9.5kHz) applied to all sensor outputs
- High-pass filter (0.1Hz) selectable via front panel switch
- Powered by internal rechargeable batteries
- Supplied with mains AC charging adaptor to allow continuous operation



Typical application

- Basic power supply for magnetic field sensors

PSU1 specification	
Number of input channels	Three
Voltage input range	$\pm 10V$
Frequency response (-3dB)	DC to 9.5kHz (DC coupling); 0.1Hz to 9.5kHz (AC coupling)
Frequency response error	DC to 6.5kHz $\pm 2\%$
Internal noise	<2pT/VHz at 1Hz (battery powered); <5pT/VHz at 1Hz (with mains charger connected)
Linearity error	1%
Offset error	0.5% full scale
Operating temperature range	-20°C to +50°C (0°C to +40°C for charging)
Storage temperature range	-20°C to +35°C long term; -20°C to +50°C short term; -20°C to +65°C without batteries
Humidity	0–90% non-condensing
Enclosure material	Extruded aluminium
Dimensions (W x H x D)	106 x 65 x 148mm
Weight	615g (battery included)
Connectors: sensor input analogue outputs battery charger inlet	Hirose RM15TRD10P 3 BNC connectors (X, Y and Z) 2.1mm socket
Power output to sensor	$\pm 12V$; $\pm 90mA$
Sensor input	Balanced/unbalanced
Analogue output voltage	$\pm 10V$
Battery	5 x AA NiMH 2450mAh Duracell® rechargeable batteries
Battery life	8 hours (typical)
Battery charging time	~3 hours for full charge

Magmeter Power Supply and Display Unit

This portable unit provides both power for most Bartington magnetic field sensors and simple access to filtered versions of the sensor's XYZ outputs. It enables rapid monitoring of magnetic fields with a maximum resolution of 0.1 μ T.

Features and options

- Incorporates three displays showing the values of the magnetic field being measured by the connected sensor
- Low-pass filtering (9.5kHz) applied to all sensor outputs
- High-pass filter (0.1Hz) selectable via a front panel switch
- Powered by internal rechargeable batteries
- Supplied with mains AC charging adaptor to enable continuous operation



Typical application

- Quick checks of magnetic field strength

Magmeter specification	
Number of input channels	Three [X, Y and Z]
Voltage input range	± 10 V
Frequency response (-3dB)	DC to 9.5kHz (DC coupling); 0.1Hz to 9.5kHz (AC coupling)
Frequency response error	DC to 6.5kHz $\pm 2\%$
Internal noise	<2pT/√Hz at 1Hz (battery powered); <5pT/√Hz at 1Hz (with mains charger connected)
Linearity error	1%
Offset error	0.5% full scale
Display	3 x 3½ digit LCD (resolution up to 0.1 μ T)
Operating temperature range	-20°C to +50°C [0°C to +40°C for charging]
Storage temperature range	-20°C to +35°C long term; -20°C to +50°C short term; -20°C to +65°C without batteries
Humidity	0–90% non-condensing
Enclosure material	Extruded aluminium
Dimensions (W x H x D)	106 x 65 x 148mm
Weight	630g (battery included)
Connectors: sensor input analogue outputs battery charger inlet	Hirose RM15TRD10P 3 BNC connectors (X, Y and Z) 2.1mm socket
Power output to sensor	± 12 V; ± 90 mA
Sensor input	Balanced/unbalanced
Analogue output voltage	± 10 V
Battery	5 x AA NiMH 2450mAh Duracell® rechargeable batteries
Battery life	8 hours (typical)
Battery charging time	~3 hours for full charge

SCU1 Signal Conditioning Unit

The mains powered SCU1 is a combined power supply, display and analogue conditioning unit for use with most Bartington magnetic field sensors. It is intended for use either as a standalone three-channel magnetic field measuring instrument, or as a pre-conditioning unit for an A to D data acquisition system.

Features and options

- Provides power to one three-axis sensor, with sensor outputs available both as analogue voltages and on LCD displays
- Low- and high-pass filtering gain, and offset available, independent for X, Y and Z channels
- Both the unconditioned and conditioned (after application of gain, offset and filtering) XYZ signals are available as analogue voltage outputs on the unit back panel
- When used with Bartington balanced (differential) sensors, the unit converts their analogue outputs into unbalanced (single-ended) signals
- Power supply voltage to the sensor can be increased for operation over long cables (up to 500m)



Typical application

- Accurate laboratory magnetic field measurements

SCU1 specifications	
Number of input channels	Three (X, Y and Z)
Input signal range	$\pm 10V$ maximum – surge protection with $\pm 12V$ clamp
Common mode rejection ratio	$> 70dB$ – fully differential input
Signal coupling	AC or DC depending on filter selection
Internal noise	Minimum discernible input signal variation of $\pm 0.1mV$ with signal/noise ratio of $\geq 10dB$ at all gain settings
Low-pass filter	1, 10, 100, 1000 or 10000Hz switch selected
High-pass filter	0 (DC), 0.01 or 1.0Hz switch selected
Gain	1, 50, 100, 300, 500 or 1000 switch selected
Offset range	$\pm 10V$
Offset control: coarse fine	10 turn potentiometer with polarity switch for each channel Centre-off position potentiometer
Display	3 x 3½ digit LCD
Thermal drift	$\leq 6mV/hour$ for filtered/null signal output with gain = 300
Operating temperature range	$-20^{\circ}C$ to $+70^{\circ}C$
Storage temperature range	$-20^{\circ}C$ to $+70^{\circ}C$
Humidity	0–90% non-condensing
Enclosure material	Aluminium
Dimensions (W x H x D)	483 (19" rack) x 88 (2U) x 300mm
Weight	5.5kg
Connectors: power input sensor input analogue output	3-way IEC with integral filter (mains cable provided) Hirose RM15TRD10P 6 x BNC sockets
Power output to sensor	$\pm 12V$, $\pm 15V$, $\pm 17V$ (switch selected) at 250mA; ripple $< 1mV$ p-p, short circuit protected; surge protection provided with $\pm 18V$ clamp
Sensor input	Balanced/unbalanced
Analogue output voltage	$\pm 10V$, three unfiltered, three filtered
Power input	110/220V AC Auto selected
Fuses	1A, 250V rating, 20mm or 3/4 inch

DecaPSU Power Supply Unit

The DecaPSU is a rack-mounted, AC-line powered power supply unit and analogue interface for up to ten Bartington Instruments three-axis magnetic field sensors.

The low-noise unit includes anti-aliasing filters to ensure the quality of the sensor signal to the customer's digitiser.

Features and options

- Powers ten magnetometers from the mains without increasing noise measured from each magnetometer
- 4-pole anti-alias filter on each channel
- Compatible with most Bartington magnetometers



Typical applications

- Multi-sensor cancellation systems
- Any application requiring a single power supply to multiple fixed, distributed sensors

Performance	
Number of inputs	Ten, each for a three-axis magnetometer
Input signal range	$\pm 10\text{V}$, surge protected at $\pm 15\text{V}$
Filter	4-pole filter, 5kHz nominal -3dB frequency
Noise	$< 2\text{pT}/\sqrt{\text{Hz}}$ at 1Hz
Linearity	Unity gain from input gain error $< 1\%$ DC, $< 5\%$ 3kHz Linearity and offset error $< 0.5\%$
Operating temperature range	-20°C to $+55^{\circ}\text{C}$
Storage temperature	-30°C to $+70^{\circ}\text{C}$
Humidity	0-90% non-condensing
Dimensions (W x H x D)	Standard 1U rack-mounting (482 x 44 x 254mm)
Weight	3kg
Input – front panel signals	Hirose RM15TRD-10P (mating connector – Hirose RM15TRD-10S)
Output connector – rear panel	2 x 37W D sub-miniature. Three signal and one ground connection for each sensor
Power connector – rear panel	3 pin IEC320
Ground point – rear panel	M4 stud
Supply voltage	90 to 264 Vac, 50 to 60Hz
Supply power / current	20 VA typical with 10 sensors; 300 to 125mA
Common-mode voltage range	$\pm 2\text{V}$
Sensor power	$\pm 15\text{V}$ at up to 65mA per output. Each output protected against overload/short circuit
Input protection	ESD and surge protection on each input against static discharge and lightning strike
Signal outputs	$\pm 10\text{V}$ nominal. Single-ended, referenced to local 0V
Signal outputs	$\pm 10\text{V}$ nominal. Single-ended, referenced to local 0V





Bartington[®]
Instruments

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